

What is claimed is:

1. A probe for measuring electrical potentials in a heart cavity, the probe comprising:
 - a terminal end portion including a plurality of electrodes, the terminal end portion conformed into a spiral shape and positioned for non-contact with the endocardial surface,
where the probe is inserted percutaneously.
2. A probe according to claim 1 further comprising means for conforming the terminal end portion into a spiral shape.
3. A probe according to claim 1, where the terminal end portion comprises a generally cylindrical shape.
4. A probe according to claim 1, where the spiral shape includes at least one of: a pigtail shape and a helix.
5. A probe according to claim 1, where the probe provides electrical potentials for reconstructing endocardial potentials on the endocardial surface.
6. A probe according to claim 5, where the reconstruction is based on a beat-by-beat basis.
7. A method for measuring electrical potentials in a heart cavity, the method comprising:
 - inserting a percutaneous probe into the heart cavity, the probe including a terminal end portion having a plurality of electrodes, the terminal end having a spiral shape, and,
 - positioning the probe for non-contact with the endocardial surface of the heart,
 - measuring the electrical potentials in the heart cavity with the probe.
8. A method according to claim 8, further comprising conforming the terminal end portion into the spiral shape after inserting.
9. A method according to claim 8, further comprising conforming the terminal end portion into the spiral shape before inserting
10. A method according to claim 8, where the terminal end portion includes a cross-section that is generally cylindrical.
11. A method according to claim 8, where the spiral shape includes at least one of: a pigtail shape and a helix.
12. A method according to claim 8, further comprising, based on the measured electrical potentials and geometry data associated with the probe and the heart, reconstructing endocardial potentials on the endocardial surface of the heart.

13. A system for determining electrical potentials on an endocardial surface of a heart, the system comprising:

a spiral-shaped catheter probe adapted to be positioned for non-contact with the endocardial surface during measurement in a cavity of the heart, the terminal end portion having a plurality of electrodes to measure electrical potentials in the cavity,

an imaging means for capturing geometric data on the probe and the endocardial surface;

processor instructions for determining a geometric relationship between the probe surface and the endocardial surface based on the geometric data, and,

processor instructions for determining endocardial potentials based on the measured electrical potentials and the geometric relationship.

14. A system according to claim 13, where the imaging means includes at least one of: a CT scan, an MRI, an ultrasound, and an X-ray.

15. A system according to claim 13, further including processor instructions for generating at least one of: electrograms and isochrones.

16. A method to determine electrical potentials throughout an endocardial surface of a heart, the method comprising:

inserting a spiral-shaped catheter probe into a cavity of the heart, the probe positioned in a cavity of the heart for non-contact with the endocardial surface during measurement, the probe having a terminal end portion having a plurality of electrodes to measure electrical potentials,

measuring electrical potentials at the plurality of electrodes during a single heart-beat,

determining a geometric relationship between the probe surface and the endocardial surface, and,

determining the endocardial potentials based on the measured electrical potentials during the single heart-beat and the geometric relationship.

17. A method according to claim 16, where determining a geometric relationship includes providing an image of the endocardial surface and the probe based on at least one of: a CT scan, an MRI, an X-ray, and an ultrasound.

18. A method according to claim 16, where inserting includes inserting at least one of: a pigtail-shaped probe and a helix-shaped probe.